**EARTH SCIENCES (M.S.)**

https://ceps.unh.edu/earth-sciences/geochemical-systems-specialization-ms

**Description**

The department of Earth Sciences offers a Master of Science degree with a specialization in Geochemical Systems. This program is intended for students with interests in all aspects of geochemistry: bedrock, sediment, water, ice, and air with particular emphasis on interpreting and modeling the interaction of these media (e.g., biogeochemistry, air quality, and climate change).

**Requirements**

**Admission Requirements**

An applicant to the M.S. program is expected to have completed one year of calculus and at least four semesters of college chemistry, physics, and/or biology; and to have an undergraduate degree or equivalent in geology, chemistry, physics, mathematics, engineering, or the biological sciences. Students lacking some background in a particular area may be admitted provided they are prepared to complete courses, without graduate credit, in which they may be deficient. The program of study a student wishes to follow and the student's undergraduate major determine the level of preparation necessary. The preparation of each student is determined before the beginning of the first semester in residence in order to plan the course of study. Each entering student is assigned an academic adviser to assist in planning a program of study.

**Degree Requirements**

Students in the thesis option must satisfactorily complete at least 30 graduate credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 graduate credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

**Geochemical Systems Specialization**

The core curriculum for the specialization in geochemical systems normally includes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 841</td>
<td>Geochemistry</td>
<td></td>
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<tr>
<td>ESCI 845</td>
<td>Isotope Geochemistry</td>
<td></td>
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<tr>
<td>ESCI 847</td>
<td>Aqueous Geochemistry</td>
<td></td>
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<tr>
<td>ESCI 852</td>
<td>Chemical Oceanography</td>
<td></td>
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<tr>
<td>ESCI 896</td>
<td>Topics (Biogeochemistry)</td>
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<tr>
<td>or NR 844</td>
<td>Biogeochemistry</td>
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**Required Courses:**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 997</td>
<td>Seminar in Earth Sciences (first year)</td>
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<tr>
<td>ESCI 998</td>
<td>Proposal Development (first year)</td>
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**Select Master's Thesis or Directed Research:**

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 899</td>
<td>Master's Thesis (6 credits)</td>
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</tr>
<tr>
<td>ESCI 898</td>
<td>Directed Research (2 credits)</td>
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**Degree Plan**

**First Year**

**Fall**

- Core Curriculum 1 Course
- Elective I Course
- ESCI 997 Seminar in Earth Sciences

**Credits** 8-9

**Spring**

- Core Curriculum 2 Course
- Elective 2 Course
- ESCI 998 Proposal Development

**Credits** 8-9

**Second Year**

**Fall**

- Core Curriculum 3 Course
- ESCI 899 Master’s Thesis (or Elective for Directed Research Option)

**Credits** 6-8

**Spring**

- Elective 3 Course
- ESCI 899 or ESCI 898 Master’s Thesis or Directed Research

**Credits** 5-7

**Total Credits** 27-33

**Student Learning Outcomes**

Students graduating with a MS in Earth Sciences (Geology, Geochemical Systems, or Ocean Mapping focus) should be able to:

**Core Knowledge**

- Demonstrate a foundation of knowledge in Geology, Geochemical Systems, or Ocean Mapping that results in expertise in at least one of the following:
  - Solid Earth Processes: An understanding of geology, geophysics, or petrology at a range of timescales, focused on, for example, the structure of the Earth, plate tectonic reconstructions, seismology and earthquake hazards, magmatic, volcanic, or metamorphic processes, or other studies that allow for the reconstruction of geologic, geophysical, or petrologic processes at a range of spatial and time scales.
  - Earth Surface Processes: An understanding of surficial processes and their manifestations in the geologic record at a range of timescales, focused on, for example, sedimentary and glacial geology, palontology, geomorphology and landscape evolution, limnology, and paleoclimatology.
  - Geochemical Processes and Elemental Cycles on Earth: An understanding of the chemistry and chemical interactions in the Earth's mantle, crust, or on the surface of the Earth in terrestrial or aquatic environments or in the atmosphere focused on, for example, biogeochemical processes that govern the distribution and cycling of elements and nutrients, processes that add and remove elements in various environments, or the chemical transformations and
exchanges between the atmosphere, oceans, and solid Earth at a range of timescales.

- Ocean Mapping Technology and Applications: An understanding of the physics sound in the ocean, focused on, for example, applications in hydrography to determine the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, harbors, and other water areas, and the tides (or water levels) and currents that occur in those bodies of water, and ocean mapping to determine subsea geomorphology.